

# STATS IN BRIEF

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## Teacher Professional Development By Selected Teacher and School Characteristics: 2011–12

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**Statistics in Brief** publications present descriptive data in tabular formats to provide useful information to a broad audience, including members of the general public. They address simple and topical issues and questions. They do not investigate more complex hypotheses, account for inter-relationships among variables, or support causal inferences. We encourage readers who are interested in more complex questions and in-depth analysis to explore other NCES resources, including publications, online data tools, and public- and restricted-use datasets. See [nces.ed.gov](https://nces.ed.gov) and references noted in the body of this document for more information.

### Professional development

enables teachers to update their knowledge, sharpen their skills, and acquire new teaching techniques, with the intent of enhancing the quality of teaching and learning (Darling-Hammond et al. 2009). Although past literature on professional development has found little causal evidence of its impact on student achievement, recent research on the effects of individual programs of professional development has found some positive effects on student outcomes (DeMonte 2013; Heller et al. 2012; Polly et al. 2015; Yoon et al. 2007). In addition, two meta-analyses of research on professional development found statistically significant effects (Blank and de las Alas 2009; Gersten et al. 2014).

Professional development has been shown to improve teachers' content knowledge and classroom pedagogy in ways that are associated with improved student learning. Several studies using hierarchical linear modeling with pre- and post-tests administered to teachers showed that teachers participating in professional development improved their level of content knowledge and, in some cases, outperformed comparison

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groups on these tests (Bell et al. 2010; Garet et al. 2008; Polly et al. 2015). Other studies of professional development have used surveys, teachers' logs, or classroom observations to document changes in pedagogy associated with improved teaching and learning, such as the use of student-centered instructional practices (Bell et al. 2010; Garet et al. 2008; Goldschmidt and Phelps 2010; Heck et al. 2008; Hill, Ball, and Schilling 2008; Polly et al. 2015; Wallace 2009).

Recent research indicates that certain characteristics of professional development are related to effectiveness in changing teacher practice and improving student learning. In particular, professional development has been found to be most effective when it focuses on the content of the subject taught; corresponds with school or classroom activities; provides active learning opportunities (e.g., observing expert teachers or leading discussions); is sustained over time; involves collective participation of teachers from the same school, subject, or grade; and includes administrative support for

planning and implementing change (Darling-Hammond et al. 2009; Desimone 2009; Desimone and Garet 2015; Whitworth and Chiu 2015; Yoon et al. 2007).

While workshops continue to be the most common type of professional development, research suggests that they may not necessarily be the most effective because of their short duration and because they are removed in time from practice or implementation of the ideas contained in the workshops (Penuel et al. 2007). Although more research is needed to establish a specific threshold, studies have suggested anywhere from 20 to 100 hours of professional development over 6 to 12 months may be needed to affect teacher practice (Banilower et al. 2006; Blank and de las Alas 2009; Desimone and Garet 2015; Yoon et al. 2007). The descriptive data presented in this report give insight into the types of professional development teachers are participating in, with what support, and for how long. The data do not address the quality of these activities or their effectiveness in improving teaching or student learning.

## DATA, MEASURES, AND METHODS

This report provides a snapshot of teacher professional development activities among U.S. public school (including charter schools) teachers using data collected through the 2011–12 Schools and Staffing Survey (SASS). SASS covers a wide variety of topics related to elementary/secondary schools, teachers, and principals, including school staff demographics, education and experience, and opinions and perceptions of school climate. Details on SASS data collection methods and results can be found in the technical notes of this report.

This report relies on data reported by public school teachers about their professional development activities during the 2011–12 school year. The report focuses specifically on the characteristics of professional development activities most related to improving teacher effectiveness.<sup>1</sup> These characteristics include the topic of the activities, the amount of time spent in those activities in the last 12 months, and the support they received for participation. The report also

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<sup>1</sup> Types of professional development were specified in the questionnaire and included content of subject(s) taught, use of computers for instruction, reading instruction, student discipline and classroom management, teaching students with disabilities, and teaching English language learner students. Teachers were able to add additional topics in the "other" category.

examines less formal professional development activities, including conducting individual or collaborative research on a topic of professional interest, working collaboratively with other teachers on instruction, and observing or being observed by other teachers for at least 10 minutes.

Each of these aspects of public school teachers' professional development is examined not only for public school teachers as a whole but also by the grades they taught (i.e., primary, middle, high, and combined), their

years of teaching experience, and the school locale (community type)<sup>2</sup> in which they taught. Research drawn from analysis of the 2003–04 and 2007–08 SASS suggests that teachers' access to, and participation in, professional development opportunities varies by these characteristics, with, for example, secondary teachers and teachers in rural schools having less access to certain types of professional development compared to their peers in primary and urban or suburban schools (Wei, Darling-Hammond, and Adamson 2010).

All comparisons of estimates were tested for statistical significance using the Student's *t* statistic, and all differences cited are statistically significant at the  $p < .05$  level. Adjustments were not made for multiple comparisons. Only those differences meeting this significance level are discussed in the key findings. For more information, see the technical notes at the end of the report.

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<sup>2</sup> School locale is a created variable collapsed from the 12-category urban-centric school locale code (SLOCP12), which was assigned using the 2000 Decennial Census data and recoded into four categories: city (large, midsize, small), suburban (large, midsize, small), town (fringe, distant, remote), and rural (fringe, distant, remote).

## STUDY QUESTIONS

**1** How prevalent are different professional development activities; how does the prevalence of these activities vary with teacher and school characteristics; and how much time do public school teachers spend on these activities?

**2** How prevalent are professional development activities that could include collaboration with other teachers, and how does this prevalence vary with teacher and school characteristics among public school teachers?

**3** How prevalent are different types of support for professional development activities among public school teachers, and how does this prevalence vary with teacher and school characteristics?

## KEY FINDINGS

- The most prevalent topic of professional development among public school teachers in 2011–12 was the content of the subjects they taught (e.g., mathematics teachers participating in professional development about math content knowledge), with 85 percent of teachers participating in such development (figure 1).
- The next most common topic of professional development among public school teachers was the use of computers for instruction (67 percent of teachers), followed by reading instruction (57 percent), student discipline and classroom management (43 percent), teaching students with disabilities (37 percent), and teaching limited-English-proficient (LEP) students or English language learners (ELLs) (27 percent) (figure 1).
- The percentage of public school teachers participating in professional development that focused on the subject(s) they taught varied by grade level taught. Proportionally more teachers of primary grades than teachers of middle and high school grades (92 percent vs. 83 and 77 percent, respectively) participated in this type of professional development (table 1).<sup>3</sup>
- The majority of teachers engaged in professional development in 2011–12 spent 8 hours or fewer on any specific type of activity with two exceptions: the content of subject(s) taught (21 percent) and reading instruction (47 percent) (figure 2).
- In addition to formal professional development activities, 81 percent of teachers participated in regularly scheduled collaboration with other teachers; 67 percent observed or were observed by other teachers for at least 10 minutes; and 45 percent conducted individual or collaborative research on a topic of professional interest (figure 3).
- Scheduled time during the contract year (weekdays in which students were not in school, allowing teachers to participate in professional development activities) was the most prevalent type of support that public school teachers received for professional development, provided to 79 percent of teachers (figure 4). The next most common types of support were release time from teaching (51 percent) and continuing education credits (50 percent).

<sup>3</sup> Primary grades teachers are those who taught at least one grade lower than 5th grade and no grade higher than 8th grade. Middle grades teachers taught no grade lower than 5th grade and no grade higher than 8th grade. High school grades teachers taught no grade lower than 7th grade and at least one grade higher than 8th grade. Combined school grades teachers are those who taught at least one grade lower than 7th grade and at least one grade higher than 8th grade, or taught all students in ungraded classrooms.

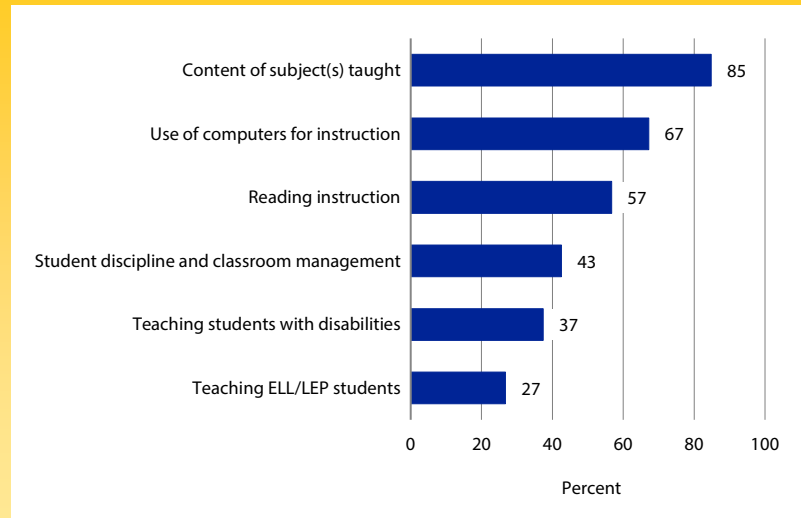
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## How prevalent are different professional development activities; how does the prevalence of these activities vary with teacher and school characteristics; and how much time do public school teachers spend on these activities?

Overall, 99 percent of teachers reported participating in some type of professional development in 2011–12 (Goldring, Gray, and Bitterman 2013). The most prevalent topic of teacher professional development in 2011–12 was the content of the subject(s) taught (85 percent), followed by the use of computers for instruction (67 percent) and reading instruction (57 percent). Teaching ELLs or LEP students was the least prevalent topic for professional development, with 27 percent of teachers participating (figure 1).

**FIGURE 1.**

**Percentage of public school teachers participating in selected professional development activities in the past 12 months: 2011–12**



NOTE: ELL refers to English language learner; LEP refers to Limited English Proficient.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

The percentage of public school teachers participating in professional development that focused on the subject(s) taught varied by grade level taught (table 1). Proportionally more teachers of primary grades than teachers of middle and high school grades (92 percent vs. 83 and 77 percent, respectively) participated in this type of professional development.<sup>4</sup>

The percentage of teachers participating in professional development focused on the use of computers for instruction varied with teachers' years of experience. For example, the percentage of teachers with 3 or fewer years of experience participating in professional development on the use of computers (58 percent) was lower than the percentage of teachers

with 20 or more years of experience (71 percent).

The percentage of teachers who participated in professional development on reading instruction varied with the grade levels taught and by school locale. Teachers of primary grades (73 percent) participated at a higher rate than teachers of middle

**TABLE 1.**

**Percentage of public school teachers participating in selected professional development activities in the past 12 months, by selected teacher and school characteristics: 2011–12**

Teacher and school characteristics	Content of subject(s) taught	Use of computers for instruction	Reading instruction	Student discipline and classroom management	Teaching students with disabilities	Teaching ELL/LEP students
<b>Total</b>	<b>84.8</b>	<b>67.2</b>	<b>56.7</b>	<b>42.5</b>	<b>37.4</b>	<b>26.8</b>
Grade level taught						
Primary	91.8	67.8	73.5	43.7	35.7	30.7
Middle	83.4	67.9	52.9	43.3	38.9	27.6
High	77.5	66.3	39.9	37.7	36.9	22.5
Combined	80.4	65.2	44.7	50.5	42.7	19.6
Years of teaching experience						
3 or fewer	83.1	58.0	53.4	52.2	35.9	28.0
4–9	84.8	66.1	57.6	42.5	37.2	28.3
10–19	85.3	68.1	57.5	39.2	37.2	26.0
20 or more	85.0	71.4	56.2	42.9	38.7	25.6
School locale						
City	87.4	65.1	61.8	46.4	38.3	38.2
Suburb	85.9	69.3	56.1	40.1	37.2	25.8
Town	82.0	66.9	56.3	41.7	36.4	21.6
Rural	82.2	67.0	52.4	41.7	37.3	18.3

NOTE: ELL refers to English language learner; LEP refers to Limited English Proficient. Grade level taught refers to grades taught by teachers. Primary grades teachers are those who taught at least one grade lower than 5th grade and no grade higher than 8th grade. Middle grades teachers taught no grade lower than 5th grade and no grade higher than 8th grade. High school grades teachers taught no grade lower than 7th grade and at least one grade higher than 8th grade. Combined grades teachers are those who taught at least one grade lower than 7th grade and at least one grade higher than 8th grade, or taught all students in ungraded classrooms. School locale is a created variable collapsed from the 12-category urban-centric school locale code, which was assigned using the 2000 Decennial Census data and recoded into four categories: city, suburban, town, and rural.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

<sup>4</sup>Primary grades teachers are those who taught at least one grade lower than 5th grade and no grade higher than 8th grade. Middle grades teachers taught no grade lower than 5th grade and no grade higher than 8th grade. High school grades teachers taught no grade lower than 7th grade and at least one grade higher than 8th grade. Combined grades teachers are those who taught at least one grade lower than 7th grade and at least one grade higher than 8th grade, or taught all students in ungraded classrooms.

grades (53 percent) or teachers of high school grades (40 percent). In city schools, 62 percent of teachers participated in professional development on reading instruction, compared with 52 percent of teachers in rural areas.

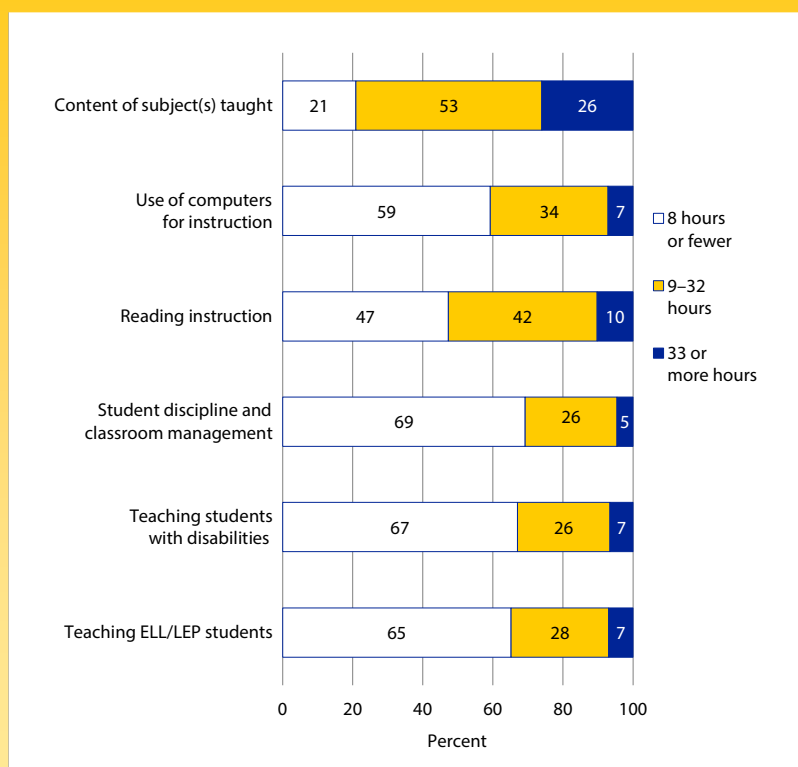
The percentage of teachers participating in professional development on student discipline and classroom management varied by years of experience and grade level taught. Teachers with the least experience, 3 or fewer years, participated at a higher rate (52 percent) than their peers with more experience (39–43 percent). Teachers of middle, primary, and combined grades (43, 44, and 50 percent, respectively) participated at a higher rate than teachers of high school grades (38 percent).

The percentage of teachers who participated in professional development on teaching LEP students or ELLs varied by locale and grade level taught. Proportionally more teachers in city schools (38 percent) participated in this type of professional development, compared with their peers in suburbs (26 percent), towns (22 percent), and rural areas (18 percent). Teachers of primary grades (31 percent) participated at a higher rate than teachers of high school grades (23 percent) and combined grades (20 percent).

Figure 2 shows the amount of time teachers who participated in a particular

**FIGURE 2.**

**Among public school teachers participating in selected professional development activities, percentage distribution of hours spent on those activities in the past 12 months: 2011–12**



NOTE: Detail may not sum to totals because of rounding. ELL refers to English language learner; LEP refers to Limited English Proficient.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

type of professional development spent on that activity in 2011–12. The majority of teachers spent 8 or fewer hours on each professional development activity in which they participated, with the exception of professional development on the content of subject(s) taught (21 percent) and professional development on reading instruction (47 percent). Of teachers who participated in professional development for student discipline and classroom management, teaching students with disabilities, and

teaching LEP students and ELLs, approximately two-thirds spent 8 or fewer hours on such activities during the year. Professional development in the subjects taught was more likely to be extended beyond 8 hours. Some 53 percent of teachers participating in professional development in subject areas spent 9 to 32 hours on this activity and 26 percent spent 33 hours or more.

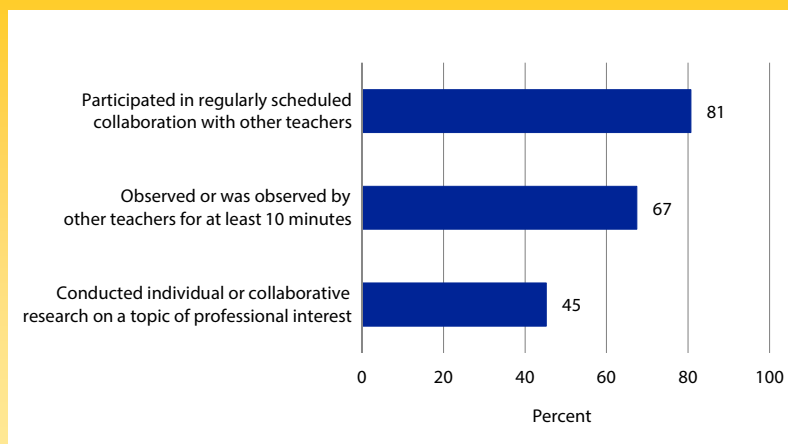


## 2 How prevalent are professional development activities that could include collaboration with other teachers, and how does this prevalence vary with teacher and school characteristics among public school teachers?

In 2011–12, public school teachers were asked whether in the last 12 months they had participated in regularly scheduled collaboration with other teachers on issues of instruction; participated in peer observation, either observing another teacher or being observed by another teacher for at least 10 minutes; or conducted research on a topic of professional interest to them, either alone or collaboratively. Four-fifths (81 percent) of all public school teachers reported participating in regularly scheduled collaboration with other teachers in 2011–12 (figure 3). Two-thirds (67 percent) of teachers participated in peer observation in 2011–12, and almost half (45 percent) conducted individual or collaborative research on a topic of professional interest.

**FIGURE 3.**

**Percentage of public school teachers participating in collaborative professional development activities in the past 12 months: 2011–12**



SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.



The percentage of teachers who regularly participated in scheduled collaboration with other teachers varied by grade level taught and school locale. Higher percentages of teachers of primary (85 percent) and middle (83 percent) grades engaged in this activity, compared with teachers of high school grades (76 percent), (table 2). Teachers in city schools (84 percent) participated at higher rates compared with their peers in suburban, town, and rural schools (81, 80, and 77 percent, respectively).

Observing or being observed by other teachers was more common among new teachers than those with more experience. For example, 77 percent of teachers with 3 or fewer years of experience observed other teachers or were observed by peers, compared with 62 percent of teachers with 20 or more years of experience. Fewer teachers in rural schools (42 percent) conducted research on their own or in collaboration with others, compared with their peers in city schools (46 percent) and suburban schools (48 percent).

**TABLE 2.**

**Percentage of public school teachers participating in collaborative professional development activities in the past 12 months, by selected teacher and school characteristics: 2011–12**

Teacher and school characteristics	Participated in regularly scheduled collaboration with other teachers	Observed or was observed by other teachers	Conducted individual or collaborative research on topic of professional interest
<b>Total</b>	<b>80.7</b>	<b>67.4</b>	<b>45.2</b>
Grade level taught			
Primary	84.6	68.2	44.9
Middle	83.0	68.4	44.4
High	75.9	67.5	46.6
Combined	70.5	60.9	44.6
Years of teaching experience			
3 or fewer	75.9	76.7	40.7
4–9	82.0	70.0	47.3
10–19	81.3	66.0	47.1
20 or more	80.5	62.4	42.4
School locale			
City	84.0	72.9	46.2
Suburb	81.3	66.8	48.1
Town	80.0	65.8	42.9
Rural	76.7	63.2	41.8

NOTE: Grade level taught refers to grades taught by teachers. Primary grades teachers are those who taught at least one grade lower than 5th grade and no grade higher than 8th grade. Middle grades teachers taught no grade lower than 5th grade and no grade higher than 8th grade. High school grades teachers taught no grade lower than 7th grade and at least one grade higher than 8th grade. Combined grades teachers are those who taught at least one grade lower than 7th grade and at least one grade higher than 8th grade, or taught all students in ungraded classrooms. School locale is a created variable collapsed from the 12-category urban-centric school locale code, which was assigned using the 2000 Decennial Census data and recoded into four categories: city, suburban, town, and rural.

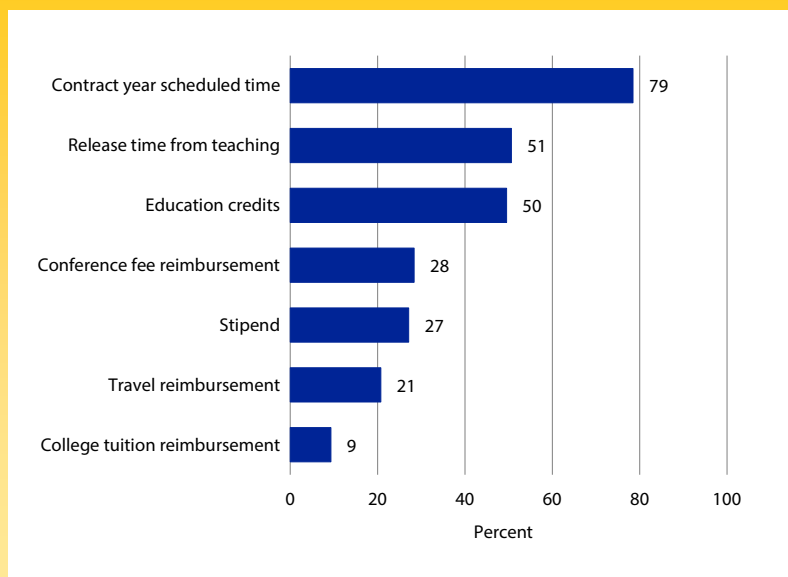
SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

### 3 How prevalent are different types of support for professional development activities among public school teachers, and how does this prevalence vary with teacher and school characteristics?

Teachers received a variety of types of support for professional development activities in 2011–12 (figure 4). The most prevalent type of support was scheduled time during the contract year, which refers to weekdays in which students are scheduled to be out of school so that teachers can participate in professional development activities. Approximately 79 percent of teachers reported receiving this type of support. The next most common types of support were release time from teaching (51 percent) and education credits for completing professional development activities (50 percent). Nearly 30 percent of teachers received conference fee reimbursement (28 percent) or a stipend (27 percent). The least common types of support were travel reimbursement (21 percent) and college tuition reimbursement (9 percent).

**FIGURE 4.**

**Percentage of public school teachers receiving support for professional development activities in the past 12 months: 2011–12**



SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

Higher percentages of teachers who taught primary and middle grades (53 percent each) received release time from teaching, compared with 45 percent of teachers of high school grades (table 3).

The percentage of public school teachers receiving education credits for professional development varied by years of teaching experience.

Fifty-five percent of teachers with 4–9 years of experience received education credits in 2011–12, compared with 48 percent of teachers with 10–19 years of experience and 46 percent of teachers with 20 or more years of experience.

A higher percentage of teachers in cities (32 percent) received a stipend in support of their professional

development, compared with their peers in suburbs (25 percent), towns (28 percent), and rural areas (24 percent). Travel reimbursement varied by grade level taught. It was more common among teachers of combined grades (30 percent) than among teachers of other grade levels (16–26 percent).

**TABLE 3.**

**Percentage of public school teachers receiving support for professional development activities in the past 12 months, by selected teacher and school characteristics: 2011–12**

Teacher and school characteristics	Contract year scheduled time	Release time from teaching	Education credits	Conference fee reimbursement	Stipend	Travel reimbursement	College tuition reimbursement
<b>Total</b>	<b>78.5</b>	<b>50.7</b>	<b>49.5</b>	<b>28.4</b>	<b>27.1</b>	<b>20.7</b>	<b>9.3</b>
Grade level taught							
Primary	80.7	53.2	49.9	25.3	28.8	16.0	9.2
Middle	78.9	52.5	49.6	26.4	28.7	19.5	9.0
High	75.1	45.4	48.6	32.7	24.5	25.8	9.7
Combined	78.2	50.5	50.2	34.9	23.0	30.3	9.7
Years of teaching experience							
3 or fewer	74.3	51.6	50.0	30.5	29.1	21.3	10.0
4–9	79.5	51.0	54.7	30.1	28.4	20.8	12.8
10–19	79.2	52.7	47.9	27.8	26.9	20.9	8.0
20 or more	78.3	47.1	45.7	26.3	25.2	20.2	6.8
School locale							
City	77.4	49.5	46.4	23.5	31.9	16.0	6.3
Suburb	79.3	50.5	47.6	26.5	25.1	15.7	10.4
Town	80.1	54.2	51.3	34.3	28.1	29.1	11.0
Rural	77.9	50.5	54.3	33.0	24.1	28.0	10.4

NOTE: Grade level taught refers to grades taught by teachers. Primary grades teachers are those who taught at least one grade lower than 5th grade and no grade higher than 8th grade. Middle grades teachers taught no grade lower than 5th grade and no grade higher than 8th grade. High school grades teachers taught no grade lower than 7th grade and at least one grade higher than 8th grade. Combined grades teachers are those who taught at least one grade lower than 7th grade and at least one grade higher than 8th grade, or taught all students in ungraded classrooms. School locale is a created variable collapsed from the 12-category urban-centric school locale code, which was assigned using the 2000 Decennial Census data and recoded into four categories: city, suburban, town, and rural.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

## FIND OUT MORE

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**<http://nces.ed.gov/pubinfo.asp?pubid=2017200>**

More detailed information on public school teachers can be found on the NCES website. Readers may be interested in the following NCES products related to the topic of this Statistics in Brief:

*Education and Certification Qualifications of Departmentalized Public High School-Level Teachers of Selected Subjects: Evidence From the 2011–12 Schools and Staffing Survey* (NCES 2015-814).  
<http://nces.ed.gov/pubsearch/pubinfo.asp?pubid=2015814>

*Education and Certification Qualifications of Public Middle Grades Teachers of Selected Subjects: Evidence From the 2011–12 Schools and Staffing Survey* (NCES 2015-815).  
<http://nces.ed.gov/pubsearch/pubinfo.asp?pubid=2015815>

*Characteristics of Public and Private Elementary and Secondary School Teachers in the United States: Results From the 2011–12 Schools and Staffing Survey* (NCES 2013-314).  
<http://nces.ed.gov/pubsearch/pubinfo.asp?pubid=2013314>

*Characteristics of Public School Teachers' Professional Development Activities: 1999–2000* (NCES 2005-030).  
<http://nces.ed.gov/pubsearch/pubinfo.asp?pubid=2005030>

For a selection of Schools and Staffing Survey data tables, go to  
<http://nces.ed.gov/surveys/sass/tables.asp>.

## TECHNICAL NOTES

### *Survey Methodology*

The estimates provided in this Statistics in Brief are based on data collected through the SASS during the 2011–12 school year. SASS contains comprehensive data on elementary and secondary schools and their staff. In schools and their associated school districts, principals, library media center staff, and teachers completed a survey that asked questions about topics such as demographics, educational background, and professional development. The resulting data allow researchers to investigate questions such as what types of professional development teachers participate in, what types of support they receive for professional development, and how professional development varies by school and teacher characteristics.

SASS was conducted by the U.S. Census Bureau on behalf of the National Center for Education Statistics (NCES). Schools were sampled from the 2009–10 Common Core of Data. Once a school was selected for the SASS sample, the Census Bureau collected and compiled Teacher Listing Forms (i.e., teacher rosters) from sampled schools and districts, primarily by mail. The Census Bureau then sampled teachers within these schools, sorting the teachers into four strata based on the levels of teaching experience.<sup>5</sup>

Within each school, teachers were sorted by the teacher stratum code, by the subject matter taught, and by a unique number assigned to identify the individual within the teacher list. Within each stratum in each school, teachers were selected with equal probability. The maximum number of teachers per school was set at 20. About 51,100 public school teachers were sampled.

Survey responses were returned to the Census Bureau, where both central processing and headquarters staff checked returned questionnaires, captured data, and implemented quality control procedures. Responses were carefully checked and edited. After editing, cases with “not-answered” values were imputed in a two-stage process that first used donor respondent methods such as hot-deck imputation. If no suitable donor case could be matched, the few remaining items were imputed using mean or mode from groups of similar cases.

Weights for the sampled units (teachers) were developed to produce national and state estimates. The starting point was the base weight, which is the inverse of the sampled teacher’s probability of selection. The base weights were adjusted for nonresponse and to ensure that sample totals (based on responding, nonresponding, and out-of-scope cases) were comparable to frame totals.

### *Response Rates*

The unit response rate indicates the percentage of sampled cases that meet the definition of a complete interview. The weighted SASS unit response rate is produced by dividing the weighted number of respondents who completed questionnaires by the weighted number of eligible sampled cases, using the initial base weight. The weighted unit response rate for public school teachers was 77.7 percent. The overall response rate represents the response rate to the survey, taking into consideration each stage of the survey. For teachers, the overall response rate is calculated as the product of the response rate to two stages: the Teacher Listing Form and the teacher questionnaire. The weighted overall response rate, using the initial base weight for public school teachers, was 61.8 percent. Because the *NCES Statistical Standards* (4-4) require analysis of non-response bias for any survey stage with a base-weighted response rate less than 85 percent (U.S. Department of Education 2012), all SASS files were evaluated for potential bias.

A comparison between the frame and the base-weighted estimates for the public school Teacher Listing Form at the national level showed evidence of bias in 43 percent of 130 potential characteristics. When the estimates were recomputed using the nonresponse-adjusted weights and compared to the frame estimates for

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<sup>5</sup> Teaching experience was stratified into four categories: 3 or fewer years, 4 to 9 years, 10 to 19 years, and 20 or more years.

the public school Teacher Listing Form, the estimates show that in the set of national estimates, bias remained in 14 percent of the characteristics compared.

A comparison between the frame and the base-weighted estimates for the public school teacher estimates showed evidence of bias in 35 percent of the 156 characteristics compared at the national level. After nonresponse adjustments were applied to the weights, the percentage of estimates with measurable bias decreased to 5 percent at the national level. For public noncharter school teachers, who constitute 85 percent of the analytical population, one category used in the report showed evidence of potential bias after nonresponse adjustments: locale–town. For public charter school teachers, who constitute 3 percent of the analytical population, one category used in the report showed evidence of potential bias after nonresponse adjustments: locale–rural. Readers should use caution when interpreting the results in these categories.

Given the extent of nonresponse in the overall response rates for teachers, NCES has taken a conservative approach of not publishing estimates for which the overall response rate falls below 50 percent. For further information on unit response rates and nonresponse bias analysis, see

Documentation for the 2011–12 SASS (Graham et al. forthcoming).

The item response rate indicates the percentage of respondents who answered a given survey question or item. The weighted SASS item response rate is calculated by dividing the base-weighted number of respondents who provided an answer to an item by the base-weighted number of respondents who were eligible to answer that item. No items in this report had a response rate less than 85 percent.

### **Variance Estimation**

Two broad categories of error occur in estimates generated from surveys: sampling and nonsampling errors. Sampling errors occur when observations are based on samples rather than on entire populations. The standard error of a sample statistic is a measure of the variation due to sampling and indicates the precision of the statistic. The complex sampling design must be taken into account when calculating such variance estimates as standard errors. Estimates in this Statistics in Brief were generated in SAS 9.2 using the balanced repeated replication method to estimate variance.

Nonsampling errors can be attributed to several sources: incomplete information about all respondents (e.g., some teachers refused to participate, or participated but answered only certain items); differences among respondents in question interpretation;

inability or unwillingness to give correct information; mistakes in recording or coding data; and other errors of collecting, processing, and imputing missing data.

### **Statistical Procedures**

Comparisons of means, medians, and proportions were tested using Student's *t* statistic. No adjustments were made for multiple comparisons. Differences between estimates were tested against the probability of a Type I error<sup>6</sup> or significance level. The statistical significance of each comparison was determined by calculating the Student's *t* value for the difference between each pair of means or proportions and comparing the *t* value with published tables of significance levels for two-tailed hypothesis testing. Student's *t* values were computed to test differences between independent estimates using the following formula:

$$t = \frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2}}$$

where  $E_1$  and  $E_2$  are the estimates to be compared and  $se_1$  and  $se_2$  are their corresponding standard errors.

There are some potential hazards in interpreting the results of statistical tests. First, the magnitude of the *t* statistics depends not only on observed differences between means or percentages, but also on the number of respondents. A small difference found in a comparison across a large

<sup>6</sup> A Type I error occurs when one concludes that a difference observed in a sample reflects a true difference in the population from which the sample was drawn, when no such difference is present.

number of respondents would still produce possibly statistically significant *t* statistics, while a seemingly large difference observed among a small number of cases might not be statistically significant.

A second hazard stems from reliance on a sample, rather than an entire

population: one can conclude that a difference found in the sample is real when there is no true difference in the population. Statistical tests are designed to limit the risk of this Type 1, or “false positive,” error by setting a significance level, or alpha. An alpha level of .05 was selected for the findings in this report. It ensures that the probability of finding

a false positive result is no more than 1 in 20 (.05) occurrences. Note that failing to meet the significance level of .05 does not mean that there is no real difference between two quantities, only that the likelihood is less.

Exhibit A-1 lists variables used in this report.

#### Exhibit A-1. Constructs and variables used in this report

Variable	Variable name in data file
<b>Professional development topics and time spent</b>	
Percentage of teachers who participated in professional development focused on content of subject(s) taught	T0338
Number of hours spent on professional development in content of subject taught in past 12 months	T0339
Percentage of teachers who participated in professional development focused on use of computers for instruction	T0341
Number of hours spent on professional development in use of computers for instruction in past 12 months	T0342
Percentage of teachers who participated in professional development focused on reading instruction	T0344
Number of hours spent on professional development in reading instruction in past 12 months	T0345
Percentage of teachers who participated in professional development focused on student discipline and classroom management	T0347
Number of hours spent on professional development in student discipline and classroom management in past 12 months	T0348
Percentage of teachers who participated in professional development focused on teaching students with disabilities	T0350
Number of hours spent on professional development in teaching students with disabilities in past 12 months	T0351
Percentage of teachers who participated in professional development focused on teaching English language learner or Limited English Proficient students	T0353
Number of hours spent on professional development in teaching English language learner or Limited English Proficient students in past 12 months	T0354
<b>Support for professional development</b>	
Percentage of teachers who received credits for completing professional development activities	T0357
Percentage of teachers who received release time from teaching to be able to participate in professional development	T0358
Percentage of teachers who received scheduled time in the contract year for professional development	T0359
Percentage of teachers who received stipend for professional development activities outside regular work hours	T0360
Percentage of teachers who received reimbursement of college tuition	T0361
Percentage of teachers who received reimbursement for conference fees	T0362
Percentage of teachers who received reimbursement for travel for professional development	T0363
<b>Collaborative professional development activities</b>	
Percentage of teachers who engaged in individual or collaborative research on a topic of professional interest in past 12 months	T0364
Percentage of teachers who participated in regularly scheduled collaboration with other teachers in past 12 months	T0365
Percentage of teachers who observed or were observed by other teachers in the classroom for at least 10 minutes in past 12 months	T0366
<b>Teacher characteristics</b>	
Grade level taught	TLEVEL
Number of years of teaching experience	TOTYREXP
<b>School characteristics</b>	
School locale	URBANS12



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## APPENDIX A: DATA TABLES

**Table A-1. Estimates for figure 2: Among public school teachers participating in selected professional development activities, percentage distribution of hours spent on those activities in the past 12 months: 2011–12**

Professional development activities	8 hours or fewer	9–32 hours	33 or more hours
Content of subject(s) taught	20.9	53.0	26.1
Use of computers for instruction	59.3	33.6	7.1
Reading instruction	47.3	42.5	10.2
Student discipline and classroom management	69.2	26.1	4.6
Teaching students with disabilities	67.0	26.5	6.6
Teaching ELL/LEP students	65.2	27.9	6.9

NOTE: Detail may not sum to totals because of rounding. ELL refers to English language learner; LEP refers to Limited English Proficient.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

## APPENDIX B: STANDARD ERROR TABLES

**Table B-1. Standard errors for table 1 and figure 1: Percentage of public school teachers participating in selected professional development activities in the past 12 months, by selected teacher and school characteristics: 2011–12**

Teacher and school characteristics	Content of subject(s) taught	Use of computers for instruction	Reading instruction	Student discipline and classroom management	Teaching students with disabilities	Teaching ELL/LEP students
<b>Total</b>	<b>0.34</b>	<b>0.52</b>	<b>0.61</b>	<b>0.57</b>	<b>0.60</b>	<b>0.59</b>
Grade level taught						
Primary	0.57	1.04	1.07	1.07	1.14	1.15
Middle	0.58	0.87	1.02	0.85	0.90	0.88
High	0.72	0.83	0.76	0.76	0.81	1.02
Combined	1.12	1.66	1.66	1.64	1.53	1.32
Years of teaching experience						
3 or fewer	0.95	1.44	1.30	1.37	1.45	1.85
4–9	0.68	1.02	1.09	1.14	1.11	1.04
10–19	0.61	0.84	0.97	0.99	0.98	0.87
20 or more	0.67	0.97	1.26	1.15	1.08	1.04
School locale						
City	0.67	1.36	1.26	1.16	1.30	1.16
Suburb	0.58	1.03	0.91	1.01	0.99	1.01
Town	0.93	1.38	1.46	1.30	1.45	1.31
Rural	0.64	0.88	1.11	0.96	0.85	0.78

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

**Table B-2. Standard errors for table A-1 and figure 2: Among public school teachers participating in selected professional development activities, percentage distribution of hours spent on those activities in the past 12 months: 2011–12**

Professional development activities	8 hours or fewer	9–32 hours	33 or more hours
Content of subject(s) taught	0.54	0.63	0.65
Use of computers for instruction	0.81	0.71	0.34
Reading instruction	0.81	0.80	0.52
Student discipline and classroom management	0.81	0.80	0.46
Teaching students with disabilities	0.86	0.81	0.39
Teaching ELL/LEP students	1.11	1.05	0.55

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

**Table B-3. Standard errors for table 2 and figure 3: Percentage of public school teachers participating in collaborative professional development activities in the past 12 months, by selected teacher and school characteristics: 2011–12**

Teacher and school characteristics	Participated in regularly scheduled collaboration with other teachers	Observed or was observed by other teachers	Conducted individual or collaborative research on topic of professional interest
<b>Total</b>	<b>0.38</b>	<b>0.51</b>	<b>0.55</b>
Grade level taught			
Primary	0.80	1.07	1.20
Middle	0.69	1.01	0.91
High	0.71	0.66	0.78
Combined	1.54	1.70	1.81
Years of teaching experience			
3 or fewer	1.36	1.07	1.61
4–9	0.81	1.00	1.03
10–19	0.64	1.04	1.00
20 or more	0.83	1.13	1.12
School locale			
City	0.82	1.21	1.19
Suburb	0.76	0.99	1.07
Town	1.06	0.99	1.26
Rural	0.66	0.75	0.89

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

**Table B-4. Standard errors for table 3 and figure 4: Percentage of public school teachers receiving support for professional development activities in the past 12 months, by selected teacher and school characteristics: 2011–12**

Teacher and school characteristics	Contract year scheduled time	Release time from teaching	Education credits	Conference fee reimbursement	Stipend	Travel reimbursement	College tuition reimbursement
<b>Total</b>	<b>0.47</b>	<b>0.64</b>	<b>0.58</b>	<b>0.50</b>	<b>0.52</b>	<b>0.39</b>	<b>0.30</b>
Grade level taught							
Primary	0.96	1.21	1.20	0.94	1.00	0.88	0.59
Middle	0.96	1.03	0.96	0.74	0.93	0.70	0.44
High	0.64	1.00	1.00	0.79	0.66	1.00	0.49
Combined	1.09	1.61	1.62	1.68	1.42	1.38	0.89
Years of teaching experience							
3 or fewer	1.40	1.57	1.44	1.42	1.60	1.33	0.89
4–9	0.89	1.04	1.16	1.02	0.88	0.81	0.67
10–19	0.81	1.02	1.00	0.68	0.88	0.59	0.44
20 or more	0.79	1.21	1.14	1.02	0.89	0.79	0.40
School locale							
City	1.11	1.57	1.08	1.08	1.27	0.98	0.62
Suburb	0.92	1.00	1.12	0.67	0.87	0.65	0.51
Town	1.15	1.53	1.61	1.26	1.38	1.12	0.85
Rural	0.77	0.93	0.82	0.80	0.91	0.73	0.47

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

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